Number Properties and Operations

Whole number sense and addition and subtraction are key concepts and skills developed in early childhood. Students build on their number sense and counting sense to develop multiplication and division. They move flexibly and fluently through basic number facts, operations and representations. Their understanding of the base-10 number system expands to include decimals. They examine various meanings and models of fractions. They explore data, perform measurements and examine patterns as part of the development process for number and operations, using other mathematics strands to enrich number. Computational fluency with whole numbers, relationships among decimals and fractions and techniques for reasonable estimations represent elementary number.

End of Primary	4th Grade	5th Grade
Number Sense		
MA-EP-1.1.1 **Students will:** **Use multiple representations (e.g., drawings, manipulatives, symbols) to describe whole numbers (0 to 999) and fractions (halves, thirds, fourths);** **Use these numbers to solve real-world and/or mathematical problems; and** **Explain how the base 10 number system relates to place value.** *MA-EP-1.1.1a* *Students will read, write, and rename whole numbers (0 to999) and apply to real-world and/or mathematical situations.*	**MA-E4-1.1.1** **Students will:** **Use multiple representations (e.g., drawings, manipulatives, symbols) to represent whole numbers (0 to 99,999) unit fractions;** **Use these numbers to solve real-world and/or mathematical problems; and** **Explain how the base 10 number system relates to place value.** *MA-E4-1.1.1a* *Students will read, write, and rename whole numbers and apply to real-world and/or mathematical situations.*	**MA-E5-1.1.1** **Students will:** **Use multiple representations (e.g., drawings, manipulatives, symbols) to represent whole numbers (0 to 100,000,000), common fractions, mixed numbers, and decimals through thousandths;** **Use these numbers to solve real-world and/or mathematical problems; and** **Explain how the base 10 number system relates to place value.** *MA-E5-1.1.1a* *Students will read, write, and rename whole numbers and apply to real-world and/or mathematical situations.*
MA-EP-1.1.2 **Students will order and compare (<, >, =) whole numbers and fractions (limited to pictorially), and explain how fractions, decimals (as money only) and whole numbers relate (equivalence, order).**	**MA-E4-1.1.2** **Students will order and compare (<, >, =) whole numbers, unit fractions (e.g., 1/2, 1/3, 1/4, etc.), and decimals (through hundredths), and explain how unit fractions, decimals, and whole numbers relate (equivalence, order).**	**MA-E5-1.1.2** **Students will order and compare (<, >, =) whole numbers, fractions, and decimals (through thousandths), and explain how unit fractions, decimals, and whole numbers relate (equivalence, order).**
Estimation		
MA-EP-1.2.1 **Students will identify or describe appropriate strategies for estimating quantities of objects and computational results (limited to addition**	**MA-E4-1.2.1** **Students will identify or describe appropriate strategies for estimating quantities of objects and computational results.**	**MA-E5-1.2.1** **Students will identify or describe appropriate strategies for estimating quantities of objects and computational results in real-world**

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and subtraction).		and/or mathematical situations.

Number Operations

MA-EP-1.3.1 **Students will identify and describe when addition, subtraction, and multiplication are appropriate in real-world and/or mathematical situations, and use the operations to solve real-world and mathematical problems, with the following constraints:** • **Adding using numbers with three digits or less;** • **Subtracting using numbers with three digits or less;** • **Multiplying using numbers of 10 or less;** • **Adding and subtracting fractions with like denominators less than four; and** • **Adding and subtracting decimals related to money.** *MA-EP-1.3.1a* *Students will divide two digit numbers by single digit divisors (with or without remainders) in real-world and/or mathematical problems.* *MA-EP-1.3.1b* *Students will skip-count forward and backward by 2's, 5's, 10's, and 100's.*	**MA-E4-1.3.1** **Students will identify and describe when addition, subtraction, and multiplication are appropriate in real-world and/or mathematical situations, and use the operations to solve real-world and mathematical problems, with the following constraints:** • **Adding using numbers with four digits or less;** • **Subtracting using numbers with four digits or less;** • **Multiplying using numbers with two digits or less;** • **Dividing using numbers with three digits or less divided by single-digit divisors (with or without remainders);** • **Adding and subtracting fractions with like denominators less than 10; and** • **Adding or subtracting decimals through hundredths.** *MA-EP-1.3.1a* *Students will skip-count forward and backwards by 2's, 3's, 4's, 5's, 20's, 20's, 25's, 50's, 100's, 1,000's, and 10,000's.*	**MA-E5-1.3.1** **Students will identify and describe when addition, subtraction, and multiplication are appropriate in real-world and/or mathematical situations, and use the operations to solve real-world and mathematical problems, with the following constraints:** • **Adding, subtracting, multiplying, and dividing whole numbers (less than 100,000,000);** • **Adding and subtracting fractions with like denominators less than 16; and** • **Adding and subtracting decimals through hundredths.** *MA-E5-1.3.1a* *Students will skip-count forwards and backwards.*

Ratios and Proportional Reasoning

Properties of Numbers and Operations

MA-EP-1.5.1 **Students will identify and give examples of odd numbers, even numbers, and multiples of numbers, and use these numbers to solve real-world and/or mathematical problems.**	**MA-E4-1.5.1** **Students will identify and give examples of odd numbers, even numbers, multiples of numbers, and factors of a number, and use these numbers to solve real-world and/or mathematical problems.**	**MA-E5-1.5.1** **Students will identify and give examples of composite numbers, prime numbers, multiples of a number, and factors of a numbers; use these numbers to solve real-world and/or mathematical problems; use factors to determine prime and composite numbers; and determine least common multiples (LCM).**

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MA-EP-1.5.2a	*MA-E4-1.5.2a*	*MA-E5-1.5.2a*
Students will use the commutative properties, the identity properties of addition and multiplication, and the zero property of multiplication in written and mental computation.	*Students will use the commutative properties, the identity properties of addition and multiplication, and the zero property of multiplication in written and mental computation.*	*Students will use the commutative properties, the associative properties, the identity properties of addition and multiplication, and the zero property of multiplication in written and mental computation.*

Students translate from measuring using nonstandard units to using standard units of measurement. They identify measurable attributes of objects, estimate and measure weight, length, perimeter, area, angles, temperature, time and money. They convert units within the same measurement system.

End of Primary	4th Grade	5th Grade
Measuring Physical Attributes		
MA-EP-2.1.1 **Students will use standard units to measure:** • **Weight (nearest pound);** • **Length (nearest half-inch or nearest centimeter);** • **Time (nearest quarter hour); and** • **Money (identify coins and bills by value).** *MA-EP-2.1.1a* *Students will use standard units to ... temperature in Fahrenheit and Ce... nearest degree.* *MA-EP-2.1.1b* *Students will choose appropriate ... s (e.g. thermometer, scales, balances, c... rule... or specific measurement tasks.* *MA-EP-2.1.1c* *Students will use nonstandard and standard units of measurement to identify measurable attributes of an object (length – in, cm; weight – oz, lb) and make an estimate using appropriate units of measurement.* *MA-EP-2.1.1d* *Students will use units of measurement to describe and compare attributes of objects to include length (in, cm), width, height, money (cost), temperature (F), and weight (oz, lb), and sort objects and compare attributes by shape,*	**MA-E4-2.1.1** **Students will use standard units ... m...** • **Weight (ounce, po... ..., kilogram);** • **Length (... rest qu... er-inch or nearest ...imete...** • **Perime...** • **Area (... that ... be divided ... ...ectan...la... ...ape...** • **...ime (...ear... ...ive ...utes); and** • **Tem...ahr...eit and Celsius).** *...2.1.1...* *Stu...s wi... ...oose appropriate tools (e.g., ...herm...et... ...cales, balances, clock, meter ...tick, ...ustick, ruler) for specific measurement ...asks.* *MA-E4-2.1.1b* *Students will use nonstandard and standard units of measurement to identify measurable attributes of an object (length and width) using appropriate units of measurement.* *MA-E4-2.1.1c* *Students will use measurements to describe and compare attributes of objects to include length (in, ft, yd, mile; cm, m, km), width, height, money (cost), temperature, and weight (oz, lb, ton; g, kg) and sort objects and compare attributes.* *MA-E4-2.1.1d*	**MA-E5-2.1.1** **Students will use standard units to measure:** • **Weight (ounce, pound; gram, kilogram);** • **Length (nearest eighth-inch or nearest centimeter);** • **Perimeter;** • **Area (figures that can be divided into rectangular shapes);** • **Time (nearest minute);** • **Temperature (Fahrenheit and Celsius); and** • **Angles (nearest degree).** *MA-E5-2.1.1a* *Students will choose appropriate tools (e.g., protractor, meter stick, ruler) for specific tasks and apply skills to solve real-world and/or mathematical problems.* *MA-E5-2.1.1b* *Students will use measurements to identify, describe, sort, and compare attributes of objects and apply these to solve real-world and/or mathematical problems.* *MA-E5-2.1.1c* *Students will measure volume of rectangular prisms, liquid capacity, and money using standard units and apply these skills to solve real-world and/or mathematical problems.*

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size, and color.	*Students will use nonstandard and standard units to measure angles (as compared to 90°).*	
		MA-E5-2.1.2 **Students will estimate weight, length, perimeter, area, angles, and time using appropriate units of measurement.**
Systems of Measurement		
MA-EP-2.2.1a *Students will describe, define, give examples of, and use to solve real-world and/or mathematical problems nonstandard and standard (U.S. Customary, metric) units of measurement to include length (in., cm.), time, money, temperature (Fahrenheit) and weight (oz., lb.); and students will determine elapsed time by half hours.*	*MA-E4-2.2.1a* *Students will describe, define, give examples of, and use to solve real-world and/or mathematical problems nonstandard and standard (U.S. Customary, metric) units of measurement (e.g., weight/mass - oz., lbs., tons, g, kg; length – in., ft., yd., mile, cm, m, km; area in square units); money; and students will determine elapsed time to the nearest quarter hour.* *MA-E4-2.2.1b* *Students will use standard units to measure money, time (elapsed), and temperature (e.g., above and below zero).*	*MA-E5-2.2.1a* *Students will describe, define, give examples of, and use to solve real-world and/or mathematical problems nonstandard and standard (U.S. Customary, metric) units of measurement*
MA-EP-2.2.2a *Students will convert units within the same measurement including money (dollars, cents), time (minute, hour), weight (ounce, pound), and length (inch, foot).*	**MA-E4-2.2.2** **Students will convert units within the U.S. customary measurement system, including money, time (seconds, minutes, hours), weight (ounces, pounds), and length (inches, feet, yards).**	**MA-E5-2.2.2** **Students will convert units within the same measurement system [U.S. customary (inches, feet, yards, miles; ounces, pounds, tons), metric (millimeters, centimeters, meters, kilometers; grams, kilograms), or time (seconds, minutes, hours)], and determine elapsed time.**

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Geometry Students explore and find basic geometric elements and terms, two-dimensional shapes and three-dimensional objects. They find and use symmetry. They move two-dimensional figures in a plane and explore congruent and similar figures.		
End of Primary	**4th Grade**	**5th Grade**
Shapes and Relationships		
MA-EP-3.1.1 **Students will identify, describe, and give examples of basic geometric elements and terms (sides, edges, faces, vertices, angles).**	**MA-E4-3.1.1** **Students will identify, describe, and give examples of basic geometric elements and terms [points, segments, lines (perpendicular, parallel, intersecting), rays, angles [acute, right, obtuse], sides, edges, faces, vertices].**	**MA-E5-3.1.1** **Students will identify, describe, and give examples of basic geometric elements and terms [points, segments, lines (perpendicular, parallel, intersecting), rays, angles (acute, right, obtuse), sides, edges, faces, vertices, radius, and diameter].**
MA-EP-3.1.2 **Students will identify, describe, and give examples of basic two-dimensional shapes (circles, triangles, squares, rectangles, trapezoids, rhombuses, hexagons), and will use these shapes to solve real-world and/or mathematical problems.**	**MA-E4-3.1.2** **Students will identify, describe, and give examples of basic two-dimensional shapes [circles, triangles (right, equilateral), squares, rectangles, trapezoids, rhombuses, pentagons, hexagons, octagons], and will use these shapes to solve real-world and/or mathematical problems.**	**MA-E5-3.1.2** **Students will identify, describe, and give examples of basic two-dimensional shapes [circles, triangles (right, equilateral), all quadrilaterals, pentagons, hexagons, octagons], and will use these shapes to solve real-world and/or mathematical problems.**
MA-EP-3.1.3 **Students will identify, describe, and give examples of basic three-dimensional shapes (spheres, cones, cylinders, pyramids, cubes), and will use these shapes to solve real-world and/or mathematical problems.**	**MA-E4-3.1.3** **Students will describe and give examples of basic three-dimensional shapes (spheres, cones, cylinders, pyramids, cubes, triangular and rectangular prisms), and will use these shapes to solve real-world and/or mathematical problems.**	**MA-E5-3.1.3** **Students will describe and give examples of basic three-dimensional shapes (spheres, cones, cylinders, pyramids, cubes, triangular and rectangular prisms), and use these shapes to solve real-world and/or mathematical problems.**
MA-EP-3.1.4a *Students will identify and describe congruent figures in real-world and/or mathematical situations.*	*MA-E4-3.1.4a* *Students will identify and describe congruent and similar figures in real-world and/or mathematical situations.*	**MA-E5-3.1.4** **Students will identify and describe congruent and similar figures in real-world and/or mathematical situations.**
Transformations of Shapes		
MA-EP-3.2.1 **Students will identify, describe, and give examples of symmetry in real-world and/or mathematical situations, and will use one line of symmetry to construct a simple geometric design.**	**MA-E4-3.2.1** **Students will identify, describe, and give examples of symmetry in real-world and/or mathematical situations, and will use one or two lines of symmetry to construct a simple geometric design.**	**MA-E5-3.2.1** **Students will identify, describe, and give examples of symmetry in real-world and/or mathematical situations; will use symmetry to construct a geometric design; and will describe how to use symmetry to construct a geometric design.**

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	MA-E4-3.2.2 **Students will identify basic two-dimensional shapes in different orientations using 90º rotations (turns) around a point of rotation, reflections (flips), and translations (slides) in a plane.**	MA-E5-3.2.2 **Students will identify and draw 90º rotations, reflections, and translations of basic shapes in a plane.**
Coordinate Geometry		
	MA-E4-3.3.1 **Students will graph ordered pairs on a positive coordinate system scaled by ones.**	MA-E5-3.3.1 **Students will graph ordered pairs on a positive coordinate system scaled by ones, twos, threes, fives, or tens, and use the coordinate system to solve real-world and/or mathematical problems.**

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Data Analysis and Probability		
Students pose questions, plan and collect data, organize and display data and interpret displays of data. They generate outcomes for simple probability activities, determine fairness of probability games and explore likely and unlikely events.		
End of Primary	**4th Grade**	**5th Grade**
Data Representations		
MA-EP-4.1.1 **Students will read/interpret, analyze, and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs with two or three sectors, line plots, two-circle Venn diagrams).** *MA-EP-4.1.1a* *Students will collect data.*	**MA-E4-4.1.1** **Students will read/interpret, analyze, and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams).** *MA-E4-4.1.1a* *Students will collect data.*	**MA-E-4.1.1** **Students will read/interpret, analyze, and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs).** *MA-E5-4.1.1a* *Students will collect data (e.g., tallies, surveys) and explain how the skills apply in real-world and/or mathematical situations.*
MA-EP-4.1.2a *Students will organize and display data.*	**MA-E4-4.1.2** **Students will organize and construct data displays (pictographs, bar graphs, line plots, Venn diagrams, tables).**	**MA-E5-4.1.2** **Students will organize and construct data displays (pictographs, bar graphs, line plots, line graphs, Venn diagrams, tables).**
Characteristics of Data Sets		
	MA-E4-4.2.1a *Students will determine the median, mode (for a data set with more than one mode), and range of a set of data.*	**MA-E5-4.2.1** **Students will determine the mean, median, mode (for a data set with no more than one mode), and range of a set of data.**
Experiments and Samples		
MA-EP-4.3.1a *Students will pose questions that can be answered by collecting data*	*MA-E4-4.3.1b* *Students will pose questions that can be answered by collecting data.*	*MA-E5-4.3.1a* *Students will describe and give examples of the process of using data to answer questions (e.g., pose a question, plan, collect data, organize and display data, interpret data to answer questions)*
Probability		
	MA-E4-4.4.1 **Students will generate all possible outcomes of an activity with up to six possible outcomes.**	**MA-E5-4.4.1** **Students will generate all possible outcomes of an activity with up to 12 possible outcomes.**

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| *MA-EP-4.4.2a*
Students will describe and give examples of the probability of an unlikely event (near zero) and a likely event (near one). | **MA-E4-4.4.2**
Students will determine the likelihood of an event, and will determine the fairness of simple probability games.

MA-E4-4.4.2a
Students will describe and give examples of the probability of an unlikely event (near zero) and a likely event (near one). | **MA-E5-4.4.2**
Students will determine the likelihood of an event, and will determine the fairness of simple probability games.

MA-E5-4.4.2a
Students will describe and give examples of the probability of an unlikely event (near zero) and a likely event (near one). |

Algebraic Thinking Students explore and examine patterns and develop rules to go with patterns. They generate input-output for functions and create tables to analyze functions. They use ordered pairs and plot points in the first quadrant of the Cartesian plane. Students use number sentences with missing values.		
End of Primary	**4ᵗʰ Grade**	**5ᵗʰ Grade**
Patterns, Relations, and Functions		
MA-EP-5.1.1 **Students will extend simple patterns (e.g., 2,4,6,8,…;◊△◊△…).**	MA-E4-5.1.1 **Students will extend, create, and find rules for patterns (e.g., 108, 208, 308, 408,…; □OO△□OO△ …) from real world and/or mathematical situations; compare and contrast simple patterns (e.g., numbers, pictures, words; e.g., △□△□△□ ; △OO△OO); and explain rules involving simple number patterns (e.g., 1, 3, 5, 7, …; 5, 10, 15, 20, …; 30, 27, 24, 21, …).**	MA-E5-5.1.1 **Students will create, extend, and find rules for patterns from real world and/or mathematical situations; compare and contrast patterns (e.g., numbers, pictures, words); and explain rules involving number patterns.**
MA-EP-5.1.2 **Students will describe and give examples of functions (input-output) through pictures and words.**	MA-E4-5.1.2 **Students will describe and give examples of functions (input-output) through pictures, tables, and words; and will analyze functions, from a table, based on real-world and/or mathematical situations.**	MA-E5-5.1.2 **Students will describe and give examples of functions (input-output) through pictures, tables, and words; and will create tables to analyze functions based on real-world and/or mathematical situations.**
Variables, Expressions, and Operations		
		MA-E5-5.2.1 **Students will connect verbal descriptions (based on real world and/or mathematical situations) and expressions using a variable or a missing value.**
Equations and Inequalities		
MA-EP-5.3.1 **Students will represent and write simple number sentences (equations and inequalities) with a missing value (e.g., 2 +$\lceil\ \rceil$ =7, $\lceil\ \rceil$< 6), and use them to solve real-world and/or mathematical problems.**	MA-E4-5.3.1 **Students will represent and write simple number sentences (equations and inequalities) with a variable or a missing value (e.g., 7 –$\lceil\ \rceil$ = 4, N + 5>14, $\frac{1}{2}$ + N = 1), and use them to solve real world and/or mathematical situations.**	MA-E5-5.3.1 **Students will represent and write simple number sentences (equations and inequalities) with a variable or a missing value (e.g., 2 x N = 4, $\lceil\ \rceil$+5>14), and use them to solve real-world and/or mathematical problems.**

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